

WHAT IS CLAIMED IS:

1. A semiconductor manufacturing apparatus comprising:  
an electrolytic plating chamber with which an  
electrolytic plating apparatus responsible for  
electrolytic plating of a substrate is constructed;  
5 an electrolytic polishing chamber with which an  
electrolytic polishing apparatus responsible for  
electrolytic polishing of the substrate is constructed;  
and  
10 a conveying chamber having installed therein a  
conveying instrument responsible for loading/unloading of  
the substrate to or from said electrolytic plating  
chamber and to or from said electrolytic polishing  
chamber, and being connected respectively to said  
15 electrolytic plating chamber and said electrolytic  
polishing chamber.
2. The semiconductor manufacturing apparatus as claimed  
in Claim 1, wherein said electrolytic plating chamber  
20 with which the electrolytic plating apparatus is  
constructed comprises:  
a holder for holding the substrate;  
a cup provided so as to oppose to said holder and is  
capable of forming a closed space, into which an  
25 electrolytic plating solution can be filled, together  
with the substrate held by said holder; and  
a nozzle for supplying a process liquid onto a  
surface of the substrate held by said holder.

3. The semiconductor manufacturing apparatus as claimed in Claim 2, wherein said process liquid comprises a cleaning liquid.

5 4. The semiconductor manufacturing apparatus as claimed in Claim 1, wherein said electrolytic polishing chamber with which the electrolytic polishing apparatus is constructed comprises:

a holder for holding the substrate;  
10 a cup provided so as to oppose to said holder and is capable of forming a closed space, into which an electrolytic polishing solution can be filled, together with the substrate held by said holder; and  
a nozzle for supplying a process liquid onto a  
15 surface of the substrate held by said holder.

5. The semiconductor manufacturing apparatus as claimed in Claim 4, wherein said nozzle for supplying the process liquid comprises:

20 a nozzle for supplying a cleaning liquid; and  
a nozzle for supplying an etching solution.

6. A semiconductor manufacturing apparatus comprising:  
an electrolytic plating chamber with which an  
electrolytic plating apparatus responsible for  
25 electrolytic plating of a substrate is constructed;  
an electrolytic polishing chamber with which an electrolytic polishing apparatus responsible for electrolytic polishing of the substrate is constructed;

an electroless plating chamber with which an electroless plating apparatus responsible for electroless plating of the substrate is constructed;

5       an annealing chamber with which an annealing apparatus responsible for annealing of the substrate is constructed; and

a conveying chamber having installed therein a conveying instrument responsible for loading/unloading of the substrate to or from said electrolytic plating 10      chamber, to or from said electrolytic polishing chamber, to or from said electroless plating chamber, and to or from said annealing chamber, and being connected respectively to said electrolytic plating chamber, said electrolytic polishing chamber, said electroless plating 15      chamber and said annealing chamber.

7.     The semiconductor manufacturing apparatus as claimed in Claim 6, wherein:

20     said conveying chamber is further connected with a liquid treatment chamber for supplying a process liquid, and

25     said conveying instrument is responsible for loading/unloading of the substrate to or from said electrolytic plating chamber, to or from said electrolytic polishing chamber, to or from said electroless plating chamber, and to or from said annealing chamber, and is also responsible for loading/unloading of the substrate to or from said liquid treatment chamber.

8. The semiconductor manufacturing apparatus as claimed in Claim 7, wherein said liquid treatment chamber comprises:

5 a holder for holding the substrate; and  
a nozzle for supplying the process liquid onto a surface of the substrate held by said holder.

9. The semiconductor manufacturing apparatus as claimed in Claim 8, wherein said nozzle for supplying the process 10 liquid comprises:

a nozzle for supplying a cleaning liquid; and  
a nozzle for supplying an etching solution.

10. The semiconductor manufacturing apparatus as claimed 15 in Claim 6, wherein said electrolytic plating chamber with which the electrolytic plating apparatus is constructed comprises:

a holder for holding the substrate;  
a cup provided so as to oppose to said holder and is capable of forming a closed space, into which an electrolytic plating solution can be filled, together with the substrate held by said holder; and  
a nozzle for supplying a process liquid onto a surface of the substrate held by said holder.

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11. The semiconductor manufacturing apparatus as claimed in Claim 10, wherein said process liquid comprises a cleaning liquid.

30 12. The semiconductor manufacturing apparatus as claimed in Claim 6, wherein said electrolytic polishing chamber

with which the electrolytic polishing apparatus is constructed comprises:

a holder for holding the substrate;

5 a cup provided so as to oppose to said holder and is capable of forming a closed space, into which an electrolytic polishing solution can be filled, together with the substrate held by said holder; and

a nozzle for supplying a process liquid onto a surface of the substrate held by said holder.

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13. The semiconductor manufacturing apparatus as claimed in Claim 12, wherein said nozzle for supplying the process liquid comprises:

a nozzle for supplying a cleaning liquid; and

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a nozzle for supplying an etching solution.

14. A method for manufacturing a semiconductor device, said method comprising:

20 a step of forming an electrolytic plated film by electrolytic plating process on a substrate; and a step of successively removing at least a part of the electrolytic plated film formed on the substrate by electrolytic polishing process without exposing the substrate to an oxidative atmosphere.

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15. The method for manufacturing a semiconductor device as claimed in Claim 14, said method further comprising a step of annealing the residual electrolytic plated film after such electrolytic polishing.

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16. The method for manufacturing a semiconductor device as claimed in Claim 14, said method further comprising, after said electrolytic polishing, a step of subjecting the substrate to chemical liquid treatment without exposing the substrate to an oxidative atmosphere.

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17. A method for manufacturing a semiconductor device, said method comprising:

a step of forming an electrolytic plated film by  
10 electrolytic plating process on a substrate;  
a step of successively removing at least a part of the electrolytic plated film formed on the substrate by electrolytic polishing process without exposing the substrate after the electrolytic plating to an oxidative  
15 atmosphere;

a step of annealing the substrate after the electrolytic polishing without exposing the substrate to the oxidative atmosphere; and

a step of forming an electroless plated film by  
20 electroless plating process on the annealed substrate without exposing the substrate to the oxidative atmosphere.

18. The method for manufacturing a semiconductor device as claimed in Claim 17, said method further comprising, after the electrolytic polishing, a step of subjecting the substrate to chemical liquid treatment without exposing the substrate to an oxidative atmosphere.